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Abstract

This paper studies the formation of pricing rules in search markets. At a cost, each seller can commit himself to a fixed price. If he takes no actions to preclude haggling, his sales price is determined through bilateral negotiations with the buyer. The selection of pricing rules exhibits strategic complementarities that may give rise to multiple equilibria. Differences in trading practices across countries and cultures may thus be consistent with equilibrium behavior. In bazaar markets, where the buyer's cost of switching sellers is relatively low, most of the trade is conducted via bargaining and prices are close to the perfectly competitive outcome.
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1 Introduction

This paper studies the formation of pricing rules in search markets. Early work on search, inspired by Stigler (1961), focused on the question of how a consumer ought to search optimally when acquiring price information is costly. Following Rothschild's (1973) criticism that these models fail to explain the origin of prices, the search market literature has investigated two different principles of price determination. The first category of models assumes that each seller posts a fixed price. The buyer then decides whether to accept this offer or to continue his search. Making a take-it-or-leave-it offer allows the seller to capture all the gains from trade. The most important implication of this assumption is the famous 'monopoly price paradox' of Diamond (1971): As long as all buyers have search costs bounded away from zero, each seller will optimally charge the monopoly price. The equilibrium outcome is thus independent of the level of search costs. The second approach avoids this rather extreme prediction by studying bilateral negotiations as an alternative pricing rule. The seller and the buyer bargain about the price and share the gains from trade. The buyer's bargaining position depends on his ability to find an alternative seller and, therefore, his share of the surplus is negatively related to the cost of search. The impact of this cost on the bargaining equilibrium has been studied in the standard search model by Bester (1988) and in markets with bilateral search by Diamond and Maskin (1979) and Rubinstein and Wolinsky (1985).

Since the two approaches have rather different implications regarding the relation between search costs and equilibrium prices, they raise the question of which pricing mechanism more appropriately describes a given search environment. This paper addresses this problem by investigating a model in which the market participants endogenously select trading rules. In particular, we study how the process of price formation is affected by the level of search costs.

Posting a take-it-or-leave-it price is not credible unless the seller has the ability to commit himself to his offer. In the absence of commitment, if the buyer rejects the offer, it is not in the seller's interest to refuse to bargain. Following Schelling's (1956) analysis of the commitment aspects of bargaining, commitment can be achieved by taking actions that make it impossible to back down from one's demand. Typically such actions are costly and so an individual will commit himself only if the benefits outweigh the cost of commitment.[1] Contracting with an outside party is a simple device that the seller can use to prevent bargaining. One possible strategy is to hire an intermediary or sales clerk, who is instructed to sell the good at a fixed price. The posted price offer then becomes credible because this agent is not authorized to negotiate price reductions.

It turns out that each individual seller's net benefit from committing to a fixed price depends on the commitment decisions of all the other sellers. This means that the selection of pricing rules constitutes a game between the sellers. This game exhibits strategic complementarity since each seller's incentive to prevent bargaining increases with the fraction of sellers who commit themselves not to haggle.[2] At least for some parameter constellations, this supermodular structure generates multiple equilibria. These equilibria differ in the pricing rule that is adopted by the majority of traders. In reality trading practices often differ across countries and cultures. The possibility of multiple equilibrium outcomes is consistent with this observation. When rational behavior shows no tendency to eliminate one or the other pricing institution over time, historical and cultural factors may become important for the evolution of pricing institutions.[3]

The analysis of markets with small search costs leads to some surprising results. In such markets there always is an equilibrium in which only a minority of sellers charges a fixed price and most of the trade is conducted via bargaining. That is, bargaining constitutes a viable pricing rule when the buyer's cost of switching sellers is relatively low. In reality the latter condition is probably satisfied in bazaar markets, where many stores offering close substitutes are located near one another. Our analysis shows that in markets with these features the sellers have little to gain from committing to a fixed price. Another implication is that equilibrium prices are close to the perfectly competitive outcome when search costs are small. The endogenous determination of trading rules thus escapes the 'monopoly price paradox'.

The two trading rules differ in the timing of price determination. In the posted pricing regime prices are fixed *before* the buyer enters a store. Negotiated pricing determines a price *after* the buyer has selected a seller. The relation between ex ante and ex post pricing is also studied in Gale (1988), Peters (1991), and Bester (1993). In these models ex ante pricing means that the buyer becomes informed about prices before he visits a seller. This is not the case here. As in the usual search model, the buyer forms rational expectations about the distribution of prices; but he has to pay a cost to find out the price at a particular store. The commitment incentives of a monopolistic seller are investigated in Riley and Zeckhauser (1983) and Fudenberg, Levine, and Tirole (1987). These authors consider a monopolist who searches for a customer. In our model the consumers engage in search and strategic interactions between the sellers are the driving force behind our results.

Section 2 of the paper introduces a simple search environment. Section 3 describes the two principles of pricing behavior. The equilibrium determination of pricing rules is studied in Section 4. Section 5 investigates some equilibrium properties and the role of search costs. Finally, Section 6 concludes by discussing limitations and possible extensions of the model.

2 The Model

Consider the simplest search model with identical buyers of a single homogeneous good. There is a continuum of sellers represented by the interval $[0, 1]$. They produce the good at constant returns to scale and their common unit production cost is $c \geq 0$. Each of the consumers wishes to purchase at most a single unit of the commodity. His reservation price is $r > c$. The consumers do not interact strategically with each other. This together with the assumption of constant returns to scale implies that the equilibrium outcome is independent of the total mass of consumers.

A seller cannot communicate with the buyer before he enters the store. From the buyer's viewpoint all sellers look alike and so he selects one of them at random. If he is not satisfied with the price at this store, he may walk out and search again. Search is costly; the buyer has to pay $s > 0$ when he switches sellers. We assume that visiting the first seller is costless. This assumption is usually made in the search literature to avoid equilibrium outcomes where the buyer refuses to enter the market. In the absence of seller or buyer heterogeneity, the standard search model predicts no repeated search. The buyer always purchases the good at the first store he visits. Nonetheless, the expected payoff from searching again is important to determine the buyer's 'outside option' and the price he actually has to pay. Let p_e denote the price the buyer expects to pay in equilibrium. After quitting a store, the buyer can either leave the market or go to another seller. Let v be the expected value of the searcher's profit if he follows an optimal strategy. Then

$$v = \max[0, r - p_e - s]. \tag{1}$$

In what follows, we study equilibria where the consumers' price expectation is consistent with the actual process of price determination.

3 Pricing Institutions

How are prices determined in search markets? In this section we will briefly explore two different pricing institutions. In the following section the determination of the pricing rule will be endogenized. A large part of search theory assumes that the seller commits to a price *before* the buyer has entered the store. Effectively, the seller then makes a take-it-or-leave-it price offer. Let p_c denote the commitment price. If the buyer is not willing to pay this price, he quits and gets the payoff v. Therefore, he will certainly accept any price p_c such that $r - p_c > v$. As long as this inequality holds, the seller could increase p_c slightly to increase profits. In equilibrium, the seller will quote a price such that the buyer is indifferent between purchasing and quitting, but always buys at the price p_c. Accordingly,

$$r - p_c = v. \tag{2}$$

Equations (1) and (2) together with the rational expectations assumption $p_e = p_c$ determine the search market equilibrium when all the sellers commit themselves to a price. It follows immediately that the equilibrium is unique with

$$\hat{p}_c = r. \tag{3}$$

Price commitment in combination with costly search allows the sellers to charge the consumer's reservation valuation. This outcome is well-known as the Diamond (1971) 'monopoly price paradox': Even in a market with many sellers the equilibrium price is the monopoly price, independently of the level of search costs.

When the seller has not committed himself, the price is determined through bilateral negotiations *after* the buyer has arrived at the store. The seller bargains separately with each prospective consumer. To study the outcome of this alternative pricing institution, we will assume that the two parties share the bargaining surplus equally according to the symmetric Nash bargaining solution. This solution can be justified by Nash's (1950) axioms; more recently Binmore, Rubinstein, and Wolinsky (1986) have suggested a non-cooperative interpretation based on the strategic alternating offers model of Rubinstein (1982). If the buyer quits, he gets v while the seller gets nothing. This determines the 'status-quo' point of the bargaining problem. The net surplus from reaching an agreement equals $r - c - v$. Let p_b denote the outcome of the price negotiation. Since the buyer gets one half of the available surplus in addition to his outside option payoff, p_b has to satisfy

$$r - p_b = 0.5(r - c - v) + v. \tag{4}$$

When sellers and buyers bargain about price, this equation together with (1) and $p_e = p_b$ defines the market equilibrium. The solution yields

$$\hat{p}_b = \min[0.5(r+c),\, c+s]. \tag{5}$$

The equilibrium price now depends on the level of search costs. If $s \geq 0.5(r-c)$, the buyer finds himself in a situation of bilateral monopoly with the seller because switching is rather costly. In this case the buyer's option of quitting plays no role so that $\hat{p}_b = 0.5(r+c)$. If $s < 0.5(r-c)$, the threat to quit enables the buyer to induce a lower price. In fact, when the search cost becomes negligible as $s \to 0$, the equilibrium price approaches the competitive price under perfect information. As in Bester (1988), the bargaining approach has the attractive feature that the market equilibria under imperfect and perfect information are very similar when search costs are small.

Obviously, $\hat{p}_c > \hat{p}_b$. The sellers earn higher profits in the scenario where they commit themselves not to haggle. Notice that $\hat{p}_c$ is independent of s and that $\hat{p}_b$ decreases with s. If commitment can be obtained at some cost, this observation might lead to the conjecture that the profit from committing to a fixed price is inversely related to the level of search costs. The posted price outcome would then appropriately describe markets with relatively low search costs; negotiated pricing would predominate when search is rather costly. In what follows, it turns out that this conjecture is not valid in general. Indeed, the comparison between $\hat{p}_c$ and $\hat{p}_b$ is misleading since these prices refer to two different environments where *all* the sellers employ the same exogenously given pricing mechanism. The endogenous determination of pricing rules will show that the individual seller's gain from commitment depends on the other sellers' sales strategy. As a result, commitment decisions generate a game between the sellers and strategic interaction effects may upset the intuition derived from equations (3) and (5).

4 The Commitment Game

We now assume that each individual seller can choose whether he wants to commit himself to a fixed price or not. This decision is not conveyed to the buyer before he selects a seller. The buyer learns only after entering a store whether he can bargain or whether the price is already fixed by the seller. How can the seller commit to a posted fixed price? The assumption of imperfect price information rules out that a concern for long-run reputation effects may induce the seller not to negotiate prices. An alternative commitment device employs the aid of a third party, as suggested by Schelling (1956). The seller may simply hire a sales clerk who is contractually obliged to sell the good at a prespecified price without making any concessions to the customers. After realizing that the agent is not authorized to negotiate price reductions, the buyer has to accept the price posted by the seller. We assume that price commitment is costly for the seller; he has to pay the amount $k > 0$ per sale to prevent haggling with the buyer. A possible interpretation is that contracting with third parties is costly; the sales agent has to be paid a fee to sell the good on the behalf of the store owner.

To study the gains from precommitment we first investigate the market equilibrium when an exogenously given fraction $0 \leq q \leq 1$ of the sellers is committed to p_c, as given by (2), while the remaining fraction $(1-q)$ sells the good at the price p_b, as given by (4). The buyer rationally anticipates the price he will have to pay and so

$$p_e = qp_c + (1-q)p_b. \tag{6}$$

The equilibrium outcome (p_c^*, p_b^*) now depends on the fraction of sellers who post a fixed price. Solving (1), (2), (4), and (6) yields

$$p_c^*(q) = \min[r,\, c + 2s/(1-q)], \tag{7}$$

and

$$p_b^*(q) = \min[0.5(r+c),\, c + s/(1-q)]. \tag{8}$$

Both prices, $p_c^*(q)$ and $p_b^*(q)$, are increasing in q as long as $s < 0.5(1-q)(r-c)$. The higher the fraction of sellers who commit to a price ex ante, the higher are the prices the buyer has to pay. This is so because his outside option payoff v is lowered when he is more likely to pay a relatively high price after quitting. Price commitment generates externalities: If some sellers preclude negotiated pricing, also the other sellers are better off. Conversely, when some fraction of sellers does not precommit to a fixed price, this exerts a negative externality on the profits of the committed sellers. The same argument also explains why $p_c^*(q) \leq \hat{p}_c$ and $p_b^*(q) \geq \hat{p}_b$.

The gross benefit from committing to a fixed price equals $p_c^*(q) - p_b^*(q)$. Accordingly, the seller will pay the cost k if $p_c^*(q) - p_b^*(q) > k$. Commitment is not profitable if $p_c^*(q) - p_b^*(q) < k$. Interestingly, $p_c^*(q) - p_b^*(q)$ is increasing in q. The incentive to preclude bargaining becomes stronger when a larger fraction of the sellers is committed to fix their price ex ante. This fact leads to a coordination problem for the sellers and the strategic complementarity of pricing mechanisms may generate a multiplicity of equilibria.

We will assume that the commitment cost k is distributed across the population of sellers according to the cumulative distribution function $F(.)$. Thus $F(k)$ denotes the fraction of sellers whose commitment cost does not exceed k. The only restriction we impose on $F(.)$ is that $F(0) = 0$. This rules out the possibility of costless price commitment. We do not require any continuity assumption; there may be mass points in the distribution or k may simply be discretely distributed.[2] In particular, all the sellers may have the same cost k. The equilibrium determination of q is studied as a non-cooperative game between the sellers. Each single seller takes q as fixed when he decides on his sales strategy. In equilibrium, q has then to be consistent with aggregate seller behavior. Since commitment is profitable for all sellers with $k < p_c^* - p_b^*$, this leads to the following definition of equilibrium.

Definition: A *commitment equilibrium* is a fraction q^* of sellers such that $q^* = F(p_c^*(q^*) - p_b^*(q^*))$.

We first investigate the existence of an equilibrium q^*.

Proposition 1: *There exists an equilibrium q^*.*

Proof: Define $\varphi(q) = F(p_c^*(q) - p_b^*(q))$. We will demonstrate that $\varphi(.)$ has a fixed-point $0 \leq q^* \leq 1$. We proceed by showing that $\varphi(q)$ is non-decreasing in q. By (7) and (8) one gets $p_c^*(q) - p_b^*(q) = \min[0.5(r-c),\ s/(1-q)]$. As $s > 0$, $p_c^*(q) - p_b^*(q)$ is non-decreasing in q. Since $F(k)$ is non-decreasing in k, this implies that $\varphi(q)$ is non-decreasing in q.

As $0 \leq F(k) \leq 1$ for all k, $\varphi(.)$ maps $[0,1]$ into $[0.1]$. This together with monotonicity of $\varphi(.)$ guarantees existence of a solution $q^* = \varphi(q^*)$ by Tarski's fixed-point theorem.[5]

Q.E.D.

Since p_c^* and p_b^* depend on the characteristics of the sellers and the buyers, also the equilibrium q^* is a function of these parameters. In the remainder, we discuss the properties of the equilibrium. In particular, we focus on the impact of the search cost s on q^*.

5 Equilibrium Pricing Rules

A special category of equilibrium occurs when all the sellers adopt the same pricing mechanism. The parameter constellations that lead to such an equilibrium may help us to determine whether one or the other pricing rule is more appropriate for the analysis of a given search environment.

Proposition 2: *There is an equilibrium such that $q^* = 0$ if and only if $F(s) = 0$ or $F(0.5(r-c)) = 0$. An equilibrium with $q^* = 1$ exists if and only if $F(0.5(r-c)) = 1$.*

Proof: There is an equilibrium with $q^* = 0$ if and only if $0 = F(p_c^*(0) - p_b^*(0))$. Since $p_c^*(0) - p_b^*(0) = \min[0.5(r-c),\ s]$ and $F(.)$ is non-decreasing, this is equivalent to $\min[F(s),\ F(0.5(r-c))] = 0$.

There is an equilibrium with $q^* = 1$ if and only if $1 = F(p_c^*(1) - p_b^*(1))$. Since $p_c^*(q) - p_b^*(q) = \min[0.5(r-c),\ s/(1-q)]$, one has $\min[0.5(r-c),\ s/(1-q)] = 0.5(r-c)$ for q sufficiently large. Therefore, the equilibrium condition is equivalent to $F(0.5(r-c)) = 1$.

Q.E.D.

The first part of Proposition 2 implies that no seller wishes to deviate from negotiated pricing when the buyers' search cost is sufficiently small and the sellers' commitment costs are bounded away from zero. More specifically, if s is smaller than the lowest k in the support of $F(.)$, there is an equilibrium with $q^* = 0$. Low search costs make precommitment on the part of the sellers less attractive. This may explain why in reality we observe bargaining in markets where stores are located near to each other and switching sellers is not very costly for the buyer as, for example, in oriental bazaars. The observation that low search costs can support bargaining as viable pricing rule is perhaps surprising in view of the results of the previous Section. But, the intuition is that the buyer's outside option v becomes more valuable when s is decreased. Price commitment allows the seller to appropriate the entire net surplus $r - v - c$ while he gets only a share of this surplus under bargaining. An increase in v reduces the difference between the two payoffs and thus the gain from precommitment.

The finding that Nash bargaining may be a stable pricing institution differs from Peters (1991) who shows that the sellers have an incentive to adopt ex ante pricing when prices elsewhere are determined by bargaining. This difference is related to a different notion of ex ante pricing. In Peters (1991) ex ante price offers are publicly observable so that a seller can affect the buyers' search behavior through advertising. He has an incentive to propose an ex ante offer to increase the probability of being matched with a buyer. In contrast, in line with the traditional search model we assume that the buyer only knows the distribution of prices but not the price or pricing rule chosen by a particular seller. Therefore, the choice of pricing modes does not influence the buyer's search strategy and each seller is equally likely to be matched with a buyer, independently of whether he uses ex ante or ex post pricing.

It follows from Proposition 2 that $0.5(r - c)$ is a critical value for the sellers' commitment cost. If $k > 0.5(r - c)$ for all the sellers, there exists an equilibrium with $q^* = 0$.

Uniform ex ante pricing constitutes an equilibrium when there is no positive mass of sellers for whom $k > 0.5(r - c)$. Thus equilibrium trading behavior may depend on the social surplus $r - c$. The higher this surplus, the more inclined are the sellers to prevent price haggling. The empirical prediction is that bargaining is more likely to be observed in search markets for low quality goods, where $r - c$ is relatively small. Indeed, casual evidence suggests that negotiated pricing is a typical characteristic of second-hand or flea-markets. In contrast, in the market for high-quality brand goods clearly posted prices seem to be the rule.

Interestingly, the conditions for an equilibrium with $q^* = 0$ and $q^* = 1$ may be fulfilled at the same time. For $s < 0.5(r - c)$ this happens if the support of $F(.)$ is contained in the interval $[s, 0.5(r - c)]$. One might suspect that multiple equilibria can arise only in situations where k is concentrated within this interval. The following example, however, demonstrates that multiplicity may persist even with dispersed distributions of k. Also, the example reveals that such distributions may result in interior equilibria with $0 < q^* < 1$.

Example: Suppose that k is uniformly distributed on $[0, 1]$ so that $F(k) = k$ for $0 \leq k \leq 1$. Let $c = 0$ and $0 < r < 2$. The equilibrium condition then becomes

$$q^* = \min[0.5r, \quad s/(1 - q^*)]. \tag{9}$$

This equation has a unique solution q_1^* if $s < [2r - r^2]/4$, where

$$q_1^* = 0.5 - \sqrt{0.25 - s}. \tag{10}$$

Notice that q_1^* tends to zero as s approaches zero. If $[2r - r^2]/4 < s < 1/4$, there are two additional solutions, q_2^* and q_3^*, with

$$q_2^* = 0.5 + \sqrt{0.25 - s} \quad \text{and} \quad q_3^* = 0.5r. \tag{11}$$

For $s > 1/4$ the unique equilibrium is given by q_3^*. In this example the number of equilibria varies with s : The equilibrium is unique for low and high values of s; there are three equilibria when s lies in some intermediate range.

Multiple equilibria arise due to a coordination problem faced by the sellers. The individual seller has a weak incentive to prevent haggling about price as long as a large fraction of the other sellers rely on ex post pricing. Conversely, he is less inclined to bargain with his customers in a market where posted pricing predominates. As in other games with strategic complementarities, the different equilibria can be ranked according to the players' welfare. All the sellers unanimously prefer a higher q^* to a lower q^*. But, non-cooperative interactions may exhibit coordination failure so that the sellers may be stuck in an inferior equilibrium. The possibility of multiple equilibria indicates that rational choice does not unambiguously predict the formation of pricing rules. After all, historical and cultural factors may play an important role in the evolution and selection of equilibrium trading behavior.

Interestingly, an interior equilibrium $0 < q^* < 1$ involves price dispersion even though all the sellers offer the same homogeneous good. With probability q^* the buyer ends up at a store where he has to pay $p_c^*(q^*)$; with probability $1 - q^*$ he has to spend only $p_b^*(q^*)$ after haggling with the seller. Of course, the source of this price dispersion are differences in the cost k. As in other search models with identical buyers, there must be some heterogeneity among sellers to generate a distribution of prices.

The above example also reveals that general comparative statics results cannot be obtained. Indeed, it may happen that an increase in s lowers the value of q^* in one equilibrium while q^* is increased in another equilibrium. Nonetheless, the following Proposition shows that one property of the example can be generalized: When s becomes small, there always is an equilibrium q^* such that $q^* \to 0$ as $s \to 0$.

Proposition 3: *For any $0 < \bar{q} < 1$ there exists an $\bar{s} > 0$ such for all $s \leq \bar{s}$ the commitment game has the following properties: There is at least one equilibrium q^* with $q^* \leq \bar{q}$. Moreover, if $F(0.5(r-c)) < 1$, there is no equilibrium such that $q^* > \bar{q}$.*

Proof: Consider $\varphi(.)$ as defined in the proof of Proposition 1. Note that, as a distribution function, $F(.)$ is right-hand continuous. This together with $F(0) = 0$ implies $\lim_{s\to 0} \varphi(\bar{q}) = 0$ for all $0 < \bar{q} < 1$. Therefore there exists an $\bar{s} > 0$ such that $\varphi(\bar{q}) < \bar{q}$ whenever $s \leq \bar{s}$. Since $\varphi(.)$ is non-decreasing, this implies $\varphi(q) \leq \bar{q}$ for all $0 \leq q \leq \bar{q}$ and $s \leq \bar{s}$. Accordingly, for $s \leq \bar{s}$, $\varphi(.)$ maps $[0, \bar{q}]$ into $[0, \bar{q}]$ and by Tarski's fixed point theorem there exists a $q^* \leq \bar{q}$ such that $q^* = \varphi(q^*)$.

To prove the second part of the Proposition, note that $F(0.5(r-c)) < 1$ implies $\lim_{s\to 0} \varphi(F(0.5(r-c))) = 0$. Therefore, $\bar{s} > 0$ can be chosen such that $\varphi(F(0.5(r-c))) \leq \bar{q}$ for all $s \leq \bar{s}$. Now suppose there is an equilibrium $q^* > \bar{q}$ even though $s \leq \bar{s}$. Then it must be the case that

$$\varphi(q^*) = q^* > \bar{q} \geq \varphi(F(0.5(r-c))). \tag{12}$$

As $\varphi(.)$ is non-decreasing, this implies $q^* > F(0.5(r-c))$. But, by definition of $\varphi(.)$ one has $\varphi(q) \leq F(0.5(r-c))$ for all $0 \leq q \leq 1$. Therefore, $F(0.5(r-c)) \geq \varphi(q^*) = q^*$, a contradiction. Q.E.D.

The endogenous determination of pricing institutions provides a way out of Diamond's (1971) monopoly price paradox. For sufficiently small search costs, there is at least one equilibrium where only a minority of sellers commits to a fixed price. Most of the trade is conducted via bargaining and in the limit $s \to 0$ all prices approach the competitive price $p = c$. In fact, any equilibrium must have this feature whenever there is an arbitrary small fraction of sellers for whom commitment is prohibitively costly in the sense that $k > 0.5(r-c)$.

Bester (1993) shows that in a market where buyers are imperfectly informed about the quality of goods, negotiated pricing tends to be replaced by posted pricing when search costs become negligible. This result is obtained because the sellers can compete as Bertrand competitors by posting ex ante offers. Advertising price information enables the seller to guarantee his customers a price before they visit his store. In the present model the sellers are unable to communicate price information and so we obtain the opposite result: When switching sellers is not very costly for the buyer, negotiated pricing will be the dominant form of trade because the sellers' profit from committing to a fixed price is rather low.

6 Conclusion

We have developed a simple framework to study the formation of pricing behavior in search markets. In our model, all sellers have the same production cost and all buyers are identical. This assumption enabled us to derive rather simple pricing formulas for the two alternative trading rules. There are no costs to bargaining because both parties immediately come to an agreement. With heterogeneous buyers this might no longer be the case when the seller is uninformed about the characteristics of his opponent. Imperfect information bargaining typically generates time costs of haggling and the final agreement will depend on the buyer's actual valuation and search cost. Negotiated pricing thus allows the seller to discriminate between different types of buyers. The cost of bargaining will then determine whether this makes negotiated pricing more attractive for the seller.

In the equilibrium of our model, each consumer visits exactly one store. There is no repeated search. Again, this is due to the assumption of identical buyers. If search cost differ, it may happen that only high-cost searchers buy the good from a seller who has committed himself to a fixed price. For a buyer with low search costs it may be advantageous to continue searching until he finds a store where the price is negotiable. In such an environment, equilibrium pricing rules might depend upon the distribution of search costs across consumers.

Footnotes

1. Crawford (1982) analyses the incentives for commitment in a bilateral monopoly framework.
2. The notion of 'strategic complementarity' has been introduced by Bulow, Geanakoplos, and Klemperer (1985) to describe games where the players best-response functions are increasing. For a general analysis of the properties of such games, see Milgrom and Roberts (1990).
3. A experimental comparison of bargaining behavior in different countries is given in Roth et al. (1991).
4. Of course, $F(.)$ has to satisfy the usual properties of a distribution function, i.e. $F(.)$ has to be nondecreasing and continuous from the right with $F(-\infty) = 0$ and $F(\infty) = 1$.
5. A statement and some economic applications of Tarski's fixed point theorem can be found in Milgrom and Roberts (1990).

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